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NEW COSTA RICAN SALAMANDERS

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Costa Rica is probably the least known herpetologically of the Central American Republics and much work still needs to be done before an adequate knowledge of the fauna can be had. Consequently it is not surprising that in the large collections made in Costa Rica in 1947 by Richard Clark Taylor and the author several novelties have been discovered. Descriptions of certain of the new forms have already appeared, and other descriptions are being prepared as time permits.

In this paper two salamanders are described, one belonging to the genus *Oedipina*, the other to the genus *Chiropterotriton*.

*Chiropterotriton abscondens* sp. nov.

*Type*.—R. C. T. No. 1414. Collected at Isla Bonita (American Cinchona Plantation), elev. 5500 ft., Volcán Poas, Caribbean drainage; Richard C. Taylor, collector, Aug. 1, 1947.

*Paratypes*.—R. C. T. Nos. 1410, 1411, 1413-1417. Collected by David Allee, Sr. Machado, and Richard C. Taylor.

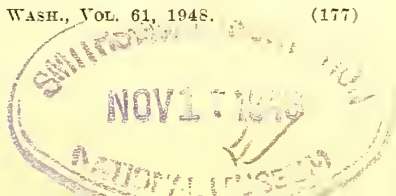
*Diagnosis*.—A diminutive *Chiropterotriton*, the adpressed limbs separated by  $4-4\frac{1}{2}$  costal folds; webbing on hands and feet involves the basal phalanges; nostril small; an arched groove on chin and throat; 14 costal grooves; maxillary teeth 12-16 on each side in males, 19-23 in females; a median palatal perforation between choanae in adults; paravomerine teeth in a single group.

*Description of the type*.—One of the smallest species of the genus; the snout-to-end-of-vent length, 32.3 mm., tail, 37 mm. Eye large, one and one third to one and one half times length of snout.

Width of an eyelid minutely less than narrowest interorbital width; nostril small, its diameter in distance between nostrils, about eight times; a transverse groove beginning some distance behind eye crosses the throat to opposite side of head; an arched groove or line on throat and chin, the transverse groove forming its base; behind this is the curved gular fold from whose side a lateral nuchal groove passes up on side of neck, first directed backward then forward and meets its fellow on the median nuchal line; posterior parts of eyelids not tucked under a fold; no orbitolabial groove present; a somewhat sinuous groove from eye to lateral nuchal groove; ceratobranchial cartilage forms a ridge or fold that extends above arm nearly to third costal groove.

Vomerine teeth 8-8 on an elevated ridge beginning outside choanae, curving in and back, the series separated by a space equal to that between two teeth, or very slightly more; paravomerine teeth forming a

NOV 15 1948



single patch, widened and slightly notched behind, separated from the vomerine series by a distance about equal to length of a row of vomerine teeth; choanae small; a median open perforation on the palate, the diameter about equal to that of a choanal opening; a free sublingual fold.

Maxillary and premaxillary teeth total 52 of which six are apparently premaxillary; vomerine teeth 8-8; mandibular teeth total 55; tongue bolitoglossoid. Swelling below nostril on edge of lip almost obsolete; 14 costal grooves, and 12 distinct costal folds, the upper edge of the folds somewhat elevated. A median dorsal groove present; about 28 caudal grooves; cloacal walls with strongly-defined lateral folds; none or only a slight basal caudal constriction; adpressed limbs separated by  $4\frac{1}{2}$  to 5 costal folds.

Fingers webbed at base leaving tip of first digit, and one and a half joints of other digits free, the web between deeply excised; toes webbed at base, the tip of first digit and two joints of other digits free of web. Distinct pads under tips of digits.

Skin generally smooth but under a lens the openings of glands give a somewhat pitted appearance. Spot behind femur insertion scarcely discernible.

*Color.*—Above brown, with a lighter cream spot on snout in front of eyes; a pair of indefinite lighter areas on nuchal region; an indistinct row of darker flecks along the dorsolateral line, bordered above posteriorly by a lighter streak; tail brownish faun, lighter at base, growing darker low on sides, and flecked with black; underside of body and tail, and to some extent low on sides of body, uniform brown; under lens small whitish flecks visible; some lighter flecks present on sides of neck and below eye.

*Measurements in mm.*—Length, snout to end of vent, 32.3; tail 37; width of head, 4.5; length of head from tip of snout to midventral part of gular fold, 5.5 (6.5 mm. when measured on side of neck to ends of gular fold); width of head in snout-vent length, 7.2 times; length of head in snout to vent length, about 5 times.

*Variation.*—The color and markings of this species varies considerably as do many of the species of this genus. The dorsal color may vary from dark blackish brown, to faun with a pattern of darker markings. For the most part the darker coloration is found in males, the lighter in females.

No. 1416 has the ground color faun with a somewhat Y-shaped mark on the occiput, a well-defined cream-colored area on the sides of nuchal region, and a series of 15 more or less well-defined chevrons along the back. A dorsolateral line is present, below which is a light stripe running from axilla to groin. Tail above and on sides faun with dark brown flecks; the underside of body and tail dark brown with minute light flecks; the chin is lighter than venter. One of the young specimens follows this pattern closely.

The variation in length of limb, in proportion to the axilla to groin length, is the same in all of the paratypes. The dorsal groove is the same in all. The males have a little larger swelling on lip below nostril, the teeth, both vomerine and maxillary are fewer, and the cloacal walls are more or less papillate.

The peculiar palatal opening is present in all the adults and one of the young; it is not discernible in two other young specimens.

*Remarks.*—The diversity of color pattern is especially similar to that which obtains in the small terrestrial members of this genus that occur on the northern part of the Mexican plateau. The sexual dimorphism in the number of teeth likewise is a generic character.

The purpose of the palatal perforation is unknown to me but it may represent a method whereby some part of the cranial cavity may be used for an accessory respiratory organ.

Two other diminutive species with which this species may be confused are "*Oedipus*" *picadoi* Stejneger and *Parvimolge richardi*, both of which occur in Costa Rica. The first species may be differentiated easily by the enlarged nostril of the young and adults; and *Parvimolge* by the structure of hands and feet, especially the enlarged elongate middle digit.

Table of Data on *Chiropterotriton abscondens* sp. nov.

No.	Snout to vent	Tail	Head width	Head length	Head width in length	Head length in length	Maxillary teeth	Premaxillary teeth	Vomerine teeth
1414 ♀	32.3	37	4.5	5.5	7.2	5.87	23-23	6	8-8
1415 ♂	31	---	4.3	5.8	7.1	5.34	14-15	6	6-6
1411 ♀	30	---	4.2	5.8	7.1	5.19	19-19	4	6-7
1412 ♂	29.9	37.3	4.4	5.7	6.8	5.24	15-16	4	6-5
1410 ♀	28	36	4.2	5.5	6.9	5.27	22-22	6	8-8
1416 ♂	28.5	37.3	4	5.4	7.1	5.27	16-15	4	6-7
1413 ♂	24.2	26.7	3.8	4.6	6.3	5.26	14-13	5	7-6
1417 ♂	21.8	25	3.35	4.1	6.5	5.41	12-12	4	4-5

*Oedipina syndactyla* sp. nov.

*Type.*—University of Kansas Museum of Natural History No. 843, taken at an elevation of about 7,000 feet, 4 miles west (by road) from Isla Bonita (American Cinchona Plantation), Volcán Poas (Eastern Caribbean drainage), Costa Rica; Edward H. Taylor, collector.

*Diagnosis.*—Snout bluntly pointed; eye large, longer than snout, equal to its distance from tip; groove from nostril deflected strongly backwards and small labial swelling on lip distinctly behind, instead of below, nostril; 20 costal grooves; limbs separated by 14-15 costal folds; digits fused together rather than webbed, the extreme tips of 2 fingers on hands, and three toes on feet, free; 27-29 maxillary teeth; 4 premaxillary teeth; 10-11 vomerine teeth; paravomerine teeth in two distinct elongate patches; neither hands nor feet as wide as their respective limbs.

*Description of the type.*—Head elongate, narrow, rather bluntly pointed anteriorly (nostrils distinctly back from tip); eye large, its length greater than snout length, equal to its distance from tip; distance between nostrils equal to their distance from eye; eyelids not tucked under a fold posteriorly; a strong, curved, gular fold with a lateral nuchal groove from its end passing up on side of neck but not reaching mid-dorsal line; a dim transverse groove anterior to gular fold passes up on sides of head to dorsal surface; a dim arched groove on throat and chin, the sides of the arch resting on the transverse groove; a very dim groove from eye to the lateral nuchal groove.

A well-defined free sublingual fold; 27-29 maxillary teeth begin slightly farther back than middle of eye; vomerine teeth 11-10, beginning outside level of choanae, then curving in and back, narrowly separated mesially; 4 premaxillary teeth; 33-36 mandibular teeth; tongue free; paravomerine teeth in two elongate patches more or less together anteriorly, separated from vomerine teeth by twice diameter of choanae.

Arms short, when extended along body their length equal to about  $2\frac{1}{2}$  folds; legs about same size; hands and feet small; digits grown together, tips of two middle fingers and three middle toes equally free, bluntly pointed; outer digits small, completely fused with adjoining digit.

Skin very smooth, even under a lens the openings of the glands not or scarcely discernible (except for a specialized somewhat depressed occipital area reaching to between eyes in which pits are especially distinct); 20 costal grooves, indistinct, the costal folds not elevated; tail presumably with a basal constriction (tail severed immediately behind vent); cloacal walls smooth with indications of lateral folds.

*Color.*—Slate gray above, gray below; edge of gular fold cream; chin lighter than venter; a cream spot below insertion of arms and legs, and undersurface of upper arm and leg with cream markings; a light glandular area behind insertion of leg; lower eyelid somewhat cream, and a lighter line following the groove from nostril to lip.

*Measurements in mm.*—Snout to end of vent, 54.8; tail short, with terminal regenerating portion broken off immediately behind vent; width of head, 4.3; length to median part of gular fold, 7.5; axilla to groin, 38; snout to arm insertion, 10.6; head width in snout-to-vent length, 12.7 times; head length in same, 7.3 times.

*Remarks.*—The unique specimen was captured in more or less open pastured land at an elevation of about 7,000 ft on Volcán Poas. Other species of the genus *Oedipina* were taken at about the same elevation.

This species differs from all known members of the genus in having the body more attenuated, and the distance between the adpressed limbs greater (width of 14-15 costal folds).